CLAIMS

What is claimed is:

1. A method of surface pretreatment before selective epitaxial growth process, comprising:

providing a semiconductor substrate having metal-oxide-semiconductor devices formed thereon;

performing a dry etching process with a carbon-free plasma source to remove a portion of said semiconductor substrate; and

performing a selective epitaxial growth process to form a semiconductor layer on said semiconductor substrate.

2. The method of claim 1, wherein said dry etching process is performed with a carbon-free plasma source containing hexaflorosulfur (SF_6) diluted with ambient gas.

3. The method of claim 2, wherein said dry etching process is performed with a carbon-free plasma source containing hexaflorosulfur (SF_6) diluted with ambient gas selected from a group consisting of helium, neon, argon, hydrogen and nitrogen.

4. The method of claim 2, wherein said dry etching process is performed with a carbon-free plasma source containing hexaflorosulfur (SF_6) having a volume ratio between about 0.5% and 5% .

5. The method of claim 3, wherein said dry etching process is performed with a carbon-free plasma source containing hexaflorosulfur (SF_6) having a volume ratio between about 0.5% and 5% .

6. The method of claim 4, wherein said dry etching process is performed at a pressure about 10 mtorr and a power between about 20 watts to about 500 watts, and an etching time within about 1 minutes.

7. The method of claim 5, wherein said dry etching process is performed at a pressure about 10 mtorr and a power between about 20 watts to about 500 watts, and an etching time within about 1 minutes.

8. The method of claim 1, wherein said dry etching process is performed to remove said semiconductor substrate about 20-50 angstroms.

9. The method of claim 2, wherein said dry etching process is performed to remove said semiconductor substrate about 20-50 angstroms.

10. The method of claim 1, wherein further comprising a baking process performed with hydrogen ambient gas at a temperature less than 750℃ prior to said selective epitaxial growth process.

11. A method of forming a semiconductor device using selective epitaxial growth, comprising:

providing a semiconductor substrate with a first conductivity;

forming a plurality of isolation regions on said semiconductor substrate;

sequentially forming a gate dielectric layer and a gate electrode on said semiconductor substrate between each pair of said isolation regions;

forming a lightly doped drain region with a second conductivity opposite to said first conductivity in said semiconductor substrate between said gate electrode and each said isolation region;

forming a first spacer around said gate dielectric layer and said gate electrode;

forming a source/drain region with said second conductivity beside said lightly doped drain region;

performing a dry etching process with a carbon-free plasma source to remove a portion of said semiconductor substrate;

performing a selective epitaxial growth process to form a semiconductor layer on said semiconductor substrate;

forming a metal layer on said semiconductor layer; and

performing a salicide process to form a silicide layer on said semiconductor substrate.

12. The method of claim 11, wherein said dry etching process is performed with a carbon-free plasma source containing hexaflorosulfur (SF_6) diluted with ambient gas.

13. The method of claim 12, wherein said dry etching process is performed with a carbon-free plasma source containing hexaflorosulfur (SF_6) diluted with ambient gas selected from a group consisting of helium, neon, argon, hydrogen and nitrogen.

14. The method of claim 12, wherein said dry etching process is performed with a carbon-free plasma source containing hexaflorosulfur (SF_6) having a volume ratio between about 0.5% and 5% .

15. The method of claim 13, wherein said dry etching process is performed with a carbon-free plasma source containing hexaflorosulfur (SF_6) having a volume ratio between about 0.5% and 5% .

16. The method of claim 14, wherein said dry etching process is performed at a pressure about 10 mtorr and a power between about 20 watts to about 500 watts, and an etching time within about 1 minutes.

17. The method of claim 15, wherein said dry etching process is performed at a pressure about 10 mtorr and a power between about 20 watts to about 500 watts, and an etching time within about 1 minutes.

18. The method of claim 11, wherein further comprising a baking process performed with hydrogen ambient gas at a temperature less than 750℃ prior to said selective epitaxial growth process.

19. The method of claim 11, wherein further comprising a step of forming a second spacer around said gate dielectric layer and said gate electrode prior to forming said first spacer.

20. The method of claim 11, wherein said metal layer is selected from a group consisting of Ti, Co, Ta, Ni, Pt and a compound thereof.